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ABSTRACT

The intended significance of text conventions must be understood if reasonably convergent text interpretation is to occur. If students can learn to recognize structural cues or signals, then they can group words into units with particular inner relationships. Expository text comprehension consists of integrating at least three structures: the written text, the concepts underlying the text, and the concepts or schemata already in the mind of the reader to which unfamiliar ideas can be related. These three structures are related through the categorizing process, which, in expository text, usually takes the classical form. This form defines attributes and sees items in a group as equivalent in some way. This implies the need to bring into the students' conscious range their own strength as categorizers in daily life, and then help them use this ability to perceive categories in text. Expository text as a hierarchy is visually signalled by such devices as headings, typefaces, and spacing on the page, as well as by punctuation and by relation and transitions words. A plan encouraging the automatic search for structure when reading involves presenting students with a text page typed only with "Xs," relating it to known conventions of expository text, and showing how to predict text from headings. (HTH)

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Meeting Students' Need to Understand Structure in Expository Text

Paper to be presented at the United Kingdom Reading Association Conference, Worcester, 1983

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Introduction

To think a certain way is also to "see" a certain way. Since each person is unique both genetically and in terms of experience, uniformity of perception in a group of people is hardly possible. For example, if four people from different backgrounds walk into a beautiful garden, they see four different gardens. The artist perhaps sees the vivid colours and structural arrangement of trees, plants and flower beds. The botanist pounces on a rare species discovered in a corner full of flowers. The interior decorator sees the possibility of dramatic arrangements of cut flowers. The tenant of a city flat sees a nice sunny corner with a bench. In each case, the inclination and prior knowledge of the viewer determines what is seen.

Reading comprehension is very similar. Four people reading an article about political elections can come up with four different versions of its meaning. It is not surprising, then, that students also interpret differently. To insure reasonably convergent interpretation, the intended significance of conventions of text must be made clear. At present, while conventions of symbolic representation in the form of letters and whole words are stressed in beginning reading, little attention is paid to visual aspects of the process at later stages of instruction. It is as though this form of perception were a thing of the past, not worthy of notice from those who have been initiated into the mystery of sentences and paragraphs. This paper will address itself to the point

that all ways of focusing on the structure of ideas on a page of expository text are valid and that visual perception of the page is one of these.

Perception of the code system needs to be stressed and stressed differently as children progress in reading. Just as even kindergarten children's perceptions of the nature and purpose of reading can be enhanced by stressing familiar code elements such as signs, logos, and symbols (Mayfield, 1983), so older students can learn to make use of what they already know and can do. Elements common to all stages, such as looking for similarities and differences between symbolic forms and noting the divisions between them, can serve as a foundation for consistently calling attention to new visual aspects, such as headings. The visual elements act as signals to the inner structure of the text (Brooks et al., Loman and Mayer, 1983).

Teaching students the skill of looking for structural or code systems as they progress in reading might be compared to the process of teaching someone first to ride a tricycle, then a small bicycle, next a ten-speed racer, and finally perhaps a pediplane. Instruction has to be geared to providing a conceptual model of the act of reading certain kinds of text since it has been found that if no model is provided by the teacher, the students will create their own (Norman, 1980).

Mindful of the great volume of recent research on text processing and of the present key words in educational research - interaction, particular context, and ecological validity - no claim is being made that understanding of the visual aspects of text processing is the only way of achieving a conceptual model of structure. There is, however, a need to

go a step "behind" verbal processing and its metacognitive aspects to the perceptual and biologically adaptive (Lenneberg, 1967) aspect of learning. All students with normal vision can see what is on a page besides words, given a little guidance. If structural cues or signals are seen, then the words are chunked, or grouped, into units with particular inner relationships. Each inner relationship can then be more minutely processed by syntactic, semantic, or cohesion methods (Halliday and Hasan, 1976, Chapman, in press). If the cues are not seen, hundreds of separate pieces of information must be processed.

The Meaning of Structure

What do we mean by structure? According to the dictionary, a structure is a complex system looked at from the point of view of the whole rather than any single part; it is a manner of construction. In text, structure is not only the hierarchy of categories, but also the logical relationships between elements of content, such as comparison, cause and effect, or statement and supporting detail. Not only is there an outline to follow in expository text, but many paragraphs are constructed around a category, elaborating on the category label, or generalization, to form a topic sentence and on the category items to support this sentence (Gerhard, 1975). Students trained to see the structure of ideas in this way can use the category format, or reduction, to list a group of items which do not have a generalization in order to provide one by abstracting the common characteristic.

The particular difficulty of discovering structure in text is that more is required than perception of one page. Higher level structure may

cover a whole chapter. Memory of what has been read and prediction of what is likely to be read are necessary at the same time that the eye is busy conveying symbols to the brain. If readers are not looking for structure, they can obviously neither remember the organization of ideas (Neisser, 1976, 1982), nor have a plan about what is likely to be perceived.

The outline, the most visible form of structure in expository text, is faithfully taught to most older students. However, the emphasis is usually on the production of writing and the stress is on Roman numerals, capital letters and so forth. If the underlying meaning of these is not understood, the significance of outline form is lost. The meaning needs to be addressed first in terms of single categories. There is a fundamental difference between the items in a set and the category label. The items may be concrete and may differ considerably while they are perceived as equivalent in some way (Olver and Hornsby, 1966). The category label, on the other hand, is an abstraction in every case, just as is any naming word.

Categories in expository text have labels which state a relationship between the items of a set. However, this relationship may be transitory so that individual members of this set may be combined with other items to form different sets. Herein lies a processing problem. The shifts may be confusing unless the structure of the whole is understood. In an article on Albert Schweitzer's many accomplishments, for example, he can be included with other people in several different sets: theologians, musicians, Bach scholars, missionaries, and doctors of tropical medicine.

The Complexities of Expository Text Comprehension

Expository text comprehension consists of integrating at least three systems or structures. There is the structure of the written text, the structure of the concepts which undergird the text, and the structure of concepts already in the mind of the reader to which unfamiliar ideas can be related. There must be interaction between the three structures for reading comprehension to take place, in addition to interaction within each structure of all the elements: cultural values, feelings, actual experiences, and language.

Language is only the visible part of this interaction. An artist might be able to conceive of a way to represent all this inner activity, but a tidy model will prove inadequate. A tidy representation will distort the picture of reading comprehension and therefore frustrate instructional attempts. The structures cannot be pictured as three points on a triangle, or even a circle, with arrows going back and forth, because within each structure the language elements both represent actual feelings and experiences and affect the way in which these are perceived and coded in memory (Britton, 1972, Copple et al., 1979, Sigel, 1981).

Text structure will depend in part on conventions of written language, in part on the particular structure of the content being discussed (Binkley, 1983), and in part on the writer's manner of structuring information and subjecting it to a particular bias. However, all three elements combine to form a pattern of categories arranged in a hierarchy.

At the base of this hierarchy are individual paragraphs. A great number of these are based on a category. The label, or generalization, is elaborated to form a topic sentence, or else it is implied. The items are elaborated within the relationship of the whole category to complete the paragraph (Gerhard, 1975). Several paragraphs are related in sections with headings, so that, in a sense, the items under a heading are the contents of the topic sentences. Several headings may in turn be "demoted" to the status of items under the general title. If all goes well, every word is related in some way to this title.

Particular subjects, or content, will also require particular structures of ideas. For example, a textbook on history will emphasize time sequences and cause and effect relationships.

The writer's cultural and professional bias will determine the prominence of some information over others, the divisions of information, and additional illustrative material included. It is only fair to say that the publisher and demands of the market place also play a part.

The structures underlying the text consist of cultural values, assumptions, shared historical experiences, and shared metaphors (Lakoff and Johnson, 1980). In essence, the writer anticipates that using certain language forms will trigger mental representations and feelings similar to his or her own and essential to meaningful reading (Paivio and Begg, 1981).

The structures, concepts, or schemata in the mind of the reader have been the subject of so much discussion that they will only be touched upon here. Human beings employ the biologically adaptive tool of

categorizing (Lenneberg, 1967) as a system for filtering the myriad bits of information available at any moment in the environment so that only those bits which are significant or meaningful are fully processed. As people look for similarities and differences in groups of experiences and form generalizations about relationships, such as naming words, these in turn influence the way in which new experiences are coded. Forming category labels allows distancing (Sigel, 1981) from immediate perceptual experience and provides the means for gradual development of more abstract, symbolic, and formal ways of processing information such as expository text. However, the same basic conditions of learning will apply to the processing of abstract information as in the early years of development. That which is not significant and meaningful to the learner will be filtered out and only information which is considered relevant will be processed. Therefore, if the reader is unaware of structure in text or considers it irrelevant, it will be glossed over or not seen at all.

The structures in the mind of the reader and the structures in a passage of expository text are at least theoretically related through the categorizing process. It may be possible to indicate ways that have been found to harmonize the two structures.

Harmonizing the text and the reader will depend on an understanding of concepts underlying the text as well as the reader's culture and stage of development. Here again the categorizing process is relevant, even when cultural metaphors are considered. Just as children categorize by different systems as they grow up (Vygotsky, 1962, Piaget and Inhelder, 1969), so also cultures in different environments and in different stages

of development categorize differently (Bruner, 1966, Rosch, 1973, Luria, 1976, Scribner and Cole, 1981). While people schooled in western industrialized societies may naturally categorize first by function, other groups see experiences as related by colour or other attributes. This natural way of relating perceived information affects whole patterns of thinking. In a similar way, devout and total adherence to particular religions appears to affect perception of events.

Instructional Implications of Seeing Comprehension as the Harmonizing of Structures

If the foregoing is true, instruction in comprehension should take the structures of the text itself, its underlying concepts, and the reader's prior knowledge into account. The three structures are related through the categorizing process. While there are different forms of categories, in expository text the classical form (Smith and Medin, 1981) is used. This form establishes relationships by defining attributes and sees items in a group as equivalent in some way. In a history textbook, for example, kings are likely to be grouped by their accomplishments or horrendous mistakes rather than by being related in ever-widening circles to a prototype king, or lumped together because the writer happens to like them personally.

Making use of existing categorizing skills

A fundamental aspect, then, of teaching comprehension of expository text should be an understanding of the process of forming classical categories. This implies the need to bring into the conscious range of students their own strengths as categorizers in daily life, then relating

this ability to the eventually desired goal of perceiving categories in text (Gerhard, 1975). The very great differences between the category label, a general abstraction about the way in which items are related, and the category items needs to be approached first in concrete situations which every student can understand. The concrete activities clearly have to include the learning and use of appropriate language for discussing the relationships being studied (Beilin, 1981).

Seeing process as an entity

A related aspect of this approach to instruction of comprehension concerns reaching an understanding of process, or procedures for thinking about information, as, in a sense "concrete entities" (Papert, 1980). That is to say, they exist independently of the particular content at hand and therefore provide transfer of advances in comprehension. Papert compares this concept of process to that of object permanence in early childhood since it gives children a tool for moving towards abstract thinking. The concept can perhaps best be approached through metaphor and analogy, or correlating a known system with one little known. For instance, students might be asked how they handle any problem at home, such as getting permission from parents which they anticipate is likely to be withheld. Do they just blurt out the request, or do they work out a plan of action which perhaps includes specially good behavior and careful choosing of the timing and particular parent? In the abstract this plan is one of problem-solving, requiring identification of the problem, analysis of various approaches, making a decision, carrying it out and so on. If a student can be shown that the "schema" for problem

solving is already in hand, then the instructional task is one of learning to apply it (Underwood, 1982). Plans must become operational (Flower and Hayes, 1981).

Providing a specific knowledge framework

This emphasis on process is not meant to detract from the importance of having knowledge of content also available. There can be no such thing as comprehension without domain-specific knowledge (Simon, 1980, Greeno, 1980, Mayer, 1983). Providing a framework of requisite knowledge before approaching a text is an honored tradition. This often includes collecting information from all the students. What is not often done is then to apply the categorizing process to the list of items provided, having the students group and label them, and carefully reviewing the language generated for appropriateness and precision. This act of categorizing information prior to reading offers opportunities to become familiar with the structure of the material and to consciously act upon it (Brooks et al., 1983).

Having briefly considered the instruction of the categorizing process, of process as an entity, and of building a scaffolding (Ausubel, 1960) of domain-specific knowledge prior to reading, the task is now to approach the structure of text as found on the page.

Seeing structure on a page of text

Expository text as a hierarchy of categories has already been mentioned. This hierarchy is visually signalled by such devices as headings, different types of print, and spacing on the page. Other types of structure are signalled by relational words like and, if, or because,

and by endings such as -er or -est. Other comparisons are expressed through analogies signalled by words such as like or by metaphors (Torangeau and Sternberg, 1982). Thus, once students are made aware of different structures of ideas, they can be trained to interpret the visual signals for them correctly and mentally act upon them, or follow a plan. A word like but can trigger a search for juxtaposition of positive and negative statements in a manner not unlike pressure being applied to the brake pedal on seeing a red traffic light. The difficulty in the past has been the "beguiling fiction" (Zalusky, 1981) that purely visual and verbal representations were completely separate: this in spite of the efforts of figures such as Arnheim, Kolers, and Feuerstein.

The structure of expository text is very different from that, for example, of story grammars, although developmentally one leads into the other. The differences have recently been pointed out in studies of detecting and remembering main ideas. Children who could do this well in stories often could not do it in expository text (Goetz and Armbruster, 1980, Baumann, 1983).

1. Setting the stage

Students might find it easier to discover main ideas if they were made aware of visual cues to the structure of ideas (Gerhard, 1981). One possibility is to translate a page of text into large and small X's while retaining the format. This has been attempted in a variety of ways by the author using textbooks in different subjects. It was found that presenting a page with nothing but X's without introduction is

counter-productive because it strays too far from traditional ways of thinking about reading. However, if a picture incorporating desired features such as vertical, horizontal, and diagonal lines, significant spaces, a frame, light and dark features, and symmetry or asymmetry, is used first to collect the necessary vocabulary and focus on the purely visual processing act, the technique serves to make structure a vivid concept. Once the features of the picture have been fully discussed and the appropriate words written, it is still necessary to explain the point of the exercise, knowing that people filter out information that is not meaningful to them. The point is to capitalize on visual ability in the interests of looking for the structure of ideas in the particular book being studied so as to save time and increase the chances of both understanding and remembering what is read.

While one could quote percentages of students who found the approach helpful, a significant study would have to include a large and varied sample and extensive follow-up exercises. Such a study has not yet been done. Nevertheless, because the approach shows real promise in making the structure of ideas vivid and emphasizing the search for structural cues, an example follows (Figure 1).

In looking at Figure 1 as a picture and speaking in strictly visual terms, it is possible to discern two main divisions of uneven extent, the bottom part being again subdivided by dark lines. There are two different examples of the use of symmetry, one made up of small shapes in three lines and the other with large and small shapes emphasized by a dark line. The divisions on the page are not only created by dark lines, but also by

Transformed Text

Lines

1. xxxxx xxxx. Xx xxx xx xxxxxxxxxxxxx xxxx xxxx
2. xx xxxxxxxxx xxxxxx xxx xx xxx xx "xxxxxxxxx" xx
3. xxxxx xx xxxxx xx xx xxxxxxx xxxx xxx xxxxxxxxx
4. xxxxxxx. Xxxx xx Xxxx (1981) xxxxxx xxx
5. xxxx xxx xxxxx xx xx xxxxxx xxxxxx
6. xxx xxxxxxx xx xxx xx xxxx (xxxxxxx)
7. xx xxxxxx xxxxxxxxx (x. 182).
8. Xxxxxxx Xxxxxxxxx Xxxxxx xx Xxxx
9. Xxxxxxxxx
10. Xxxxxxxxx xx xx xxx xx xxxxxxxxxx xxxxxxx
11. xxxxxxx xxxx xx xxxxxxx xxxxxxx xx xx xx xxxxx
12. xx xx xxxxx/xxxxxx xxxxxxxxxx. Xx xxx xxxx xx
13. xxxxxxxxxx xxxxxx, xx xx xxxx xx xx xxxx xxxxx
14. xx xxxxx xxxxx xxxx xx xxxxxx xx xxxxxx xxxx
15. xxxxxxxx xx xx xxxx xx xxxxxxx xxxxx xx xxxxx
16. xx xxxxxxx.
17. Xx xxxxxxx xx xxx xxxxx xxxxxx xx xxxxxxx
18. xxxxx xxxxxxxxx xx xx xxxxxx xxxx xx xx xx xxxx
19. xxxxxxx xx; xxx xx xxxxxxxx; xxxx, xxxxxxxxx,
20. xx xxxxxxx; xx xxxxx xx xxxxxxxx xx xxxxxxx;
21. xx xx xxx xx xxxxx.
22. Xxxxxxx xx Xxxxxxxxx Xx
23. Xxxxxxxxx
24. Xxxx xxxxxxx xx xx xxxx xxxxxxx xxxxxxxxxx.

Figure 1.

(Note. No attempt is made to reproduce the exact number of letters of the original page because this cannot be done on an ordinary typewriter.)

spaces between horizontal lines of shapes and in relation to the frame. Besides the predominant shape in large and small versions with an emphasis on horizontal lines, there are a number of other shapes presented, such as ( ), /, a number of dots and 1, 2, 8, and 9 in different combinations. This will suffice for the following discussion of the significance of the visual signals when thought of as cues to the structure of ideas.

2. Interpreting visual cues

Looking at Figure 1 now as a page of text, a few salient features can be mentioned. The symmetrically placed heading (line 8) which divides the page is apparently a main heading. Below it are two subheadings (lines 9 and 22) and a sub-subheading (line 23). Interpreting these divisions of the text and predicting likely structural features might lead to the conclusion that the lines above the main heading (1-7) are the end of another main portion of the text, or an introduction to what follows. Clearly, the three closely spaced lines are a quotation from a recent book which contains at least 182 pages. The presence (line 23) of a sub-subheading indicates that on the following pages there will be at least one more such heading and that, when the page is turned, all three layers of headings need to be kept in mind, but especially the third layer, until the next heading is encountered.

The punctuation on the page reveals further structural aspects. The conspicuous slash mark (line 12) might indicate contrasting terms. The one comma in the following line (13) probably indicates a clause. This is in contrast to the commas (line 20) coming close together, almost certainly indicating items in a previously named category. These commas

occur within a passage divided by four semicolons which indicate complex items within a higher level category. There is, then, a good example of a hierarchy of categories, one embedded in the other.

By looking at this page in purely visual terms and then relating these to what is known about conventions of expository text, it has been possible to determine a number of structural aspects without reading a word. Eliminating the words appears to force a stress on structure. Interestingly, in a parallel development, Michael Twyman of Reading University has been using the same technique for several years in order to teach typography. A mental representation of structure as an entity, to return to Papert's expression, is provided and there is therefore a possibility of having an operational plan of looking for specific visual cues which are likely to reveal elements of structure.

3. Predicting from headings

The next step in encouraging readers to use pattern recognition as a projective tool is to reveal the topics being discussed by providing the headings. These are

Cognitive Intervention Through the Categorizing Process (line 8)

Introduction (line 9)

Deficit or Developmental Lag (line 22)

Introduction (line 23)

It appears likely that the first introduction places (1) cognitive intervention, and (2) the categorizing process in a particular context. The second paragraph is indeed likely to list the five forthcoming sections, followed by the first topic as a heading. This topic will be

covered at least by the introduction and a section on (1) deficit, and (2) developmental lag. The subsequent heading on a following page is highly likely to be about deficit.

Predicting from headings is certainly not a new technique in teaching reading comprehension. However, having puzzled over the "X" page, students may be curious about identifying the topics. In other words, now that they have concentrated on structure and have a mental representation of the structure of this particular page, they are no longer filtering it out as being meaningless. If the "X" page is indeed a translation of a page of text they need to read for a class, it will perhaps be of interest to find out something about it. There is also an element of playing detective involved. Famous detectives often find solutions to crimes in fiction by shifting the way in which they perceive events. In order to accomplish this shift, they use plans of listing everything that is known about a problem and then categorizing the items on the list in novel ways. The plan for solving the problem of readers seeing only words on pages of text has consisted of promoting a visual mind set with the picture, analyzing visual aspects of the "X" page, relating these aspects to known conventions of expository text, and predicting content from headings. Actual reading of the page (Figure 2) should result in students being surprised at how much they can anticipate.

This plan, if frequently referred to or used several times, may provide a way of encouraging an automatic search for structure when reading. Certainly, it will not be effective as a one-shot lesson plan.

Original Text

formal terms. The kind of information being processed may well affect the categorizing approach used so that more "natural" information, such as colors, is related to a prototype while textbooks require classical categorizing. Smith and Medin (1981) conclude that

> there will likely be no crucial experiments or analyses that will establish one view of concepts [categories] and rule out all others irrevocably (p. 182).

Cognitive Intervention Through the Categorizing Process

Introduction

Intervention in the rate of developmental change or the ultimately attained level of cognitive processing goes to the heart of the nature/nurture controversy. In this brief review studies are presented not as conclusive evidence, but for the way in which they add small pieces to the immense jigsaw puzzle and indicate how teacher knowledge about categorizing and its place in organized thought might be a useful aspect of intervention.

The discussion in this section includes the question of whether student difficulties can be accounted for by a deficit theory or one of developmental lag; ways of looking at intelligence; memory, metacognition, and prediction; the question of consciousness and automatic operations; and the role of language.

Deficit or Developmental Lag

Introduction

Those subscribing to a deficit theory of poor student performance,

Figure 2

Gerhard, C. Teacher Knowledge about Selected Aspects of Categorizing and their use in Instruction of sixth, seventh, and eight grade students. Unpublished doctoral dissertation, George Washington University, 1983, p.46.

Understanding different conceptual systems

Harmonizing the structure of text and the schemata of prior knowledge in the reader's mind will be incomplete without including the accompaniment of underlying concepts: assumptions, inferences, metaphors, and cultural bias. No area of comprehension is more difficult to approach in instructional terms. The underlying concepts are not broadly stated, but rather implied by the use of particular language.

In any given culture or subculture there is a likelihood that members of that group will expect all people to think as they do. In fact, as already noted, people even categorize events in their environment by different attributes. There can also be differences in orientation. Lakoff and Johnson (1980) provide a telling example. In Western countries, a writer might refer to a cloud as being in front of a mountain if it is between the person and the mountain. The orientation is away from the body. In other cultures, the identical spatial situation could be described as "the cloud behind the mountain" because the orientation is towards the body. These authors list other aspects of conceptual systems which can vary greatly. They include dimensions of experience such as participants in an action, the prototypes developed individually through experience, and interactional properties. As one example of conceptual systems leading to different interpretations, any text related to the role of women nowadays would surely evoke very different reactions around the world.

It is not possible here to pursue the many ways in which fundamental relational concepts can differ from culture to culture. The only certainty is that they do. Instruction must therefore include a careful look at

the language of an expository passage for clues as to personal and cultural bias. Equally important, however, is knowledge about student ways of processing information which can only be obtained by providing opportunities for groups of students to work on problems and then observing and listening very carefully. This type of observation has been an important part of instruction and research in the early school years (Cocking, 1983) and should be promoted on the secondary level.

Secondary teachers also have to remain open to the idea that there may be more than one way of logically relating items of information, even though one or the other is more appropriate at a given juncture. If the reader is to become independent and feel competent to comprehend the ideas of others, then his or her own ideas must be considered seriously. If there is an error, the reasoning behind the error needs to be addressed. In other words, the Piagetian framework needs to be extended in order to understand self-directed learning within the ecological setting of the school (Ginsburg, 1981). At the same time, readability needs to be looked at in terms of structure and the learning strategies of the reader (Amiran and Jones, 1982, Garner and Anderson, 1982, Wagoner, 1983).

Secondary Teacher Thinking About Categorizing

Secondary teachers' own thinking processes must play a significant role in helping students comprehend the content of texts used in their classrooms. The same learning conditions apply to them as to their students: they categorize information in daily life and they process the information which appears meaningful to them. Fully understanding the categorizing process and applying that understanding to instruction of

comprehension should logically lead to certain kinds of teaching behaviours, as demonstrated in the Taba studies (1966, 1969). Clear, unambiguous examples of information which was important for comprehension would initially be provided (Bruner, 1956). Opportunities for students to participate in making decisions about grouping the information would be given. Cues to particular relationships would be studied and the interpretation of these practised (Lysakowski and Walberg, 1981, 1982). Opportunities for creating category labels in appropriate language would be created and new examples of items for these categories sought. The reasoning behind incorrect categorizing would be looked for.

There has been a recent revival of interest in teacher thinking (Mandl and Huber, 1982, Bamberger, 1983). One study investigated teacher knowledge about categorizing and ability to create category labels (Gerhard, 1983). Science teachers were significantly better in both areas than the English and sixth year teachers in the sample. It is probably easier to understand the significance of categorizing in science classes, but opportunities for learning about language should be greater in the other areas.

Conclusion

Approaching reading comprehension as the harmonizing of three structural systems, that of the text itself, the underlying concepts, and the reader's prior knowledge, may seem to make it even less tractable. However, using techniques to improve comprehension of expository text which address only superficial aspects of the problem is not likely to produce independent readers who feel competent and therefore are able to

enjoy reading. Equally, crash, short-term projects, while initially stimulating, will have to give way to long-term instruction in thinking processes.

There are two basic tools with which to work, although one might be considered a part of the other. Students are capable of being trained to perceive information in different ways and they are capable of seeing other aspects of a page of text besides words. This perceptual aptitude is part of the adaptive tool of categorizing experiences in order to note them, remember them, and predict from known patterns to unknown events.

The basic categorizing process includes looking for similarities and differences and forming general statements, or category labels, to express relationships between groups of items. While this is initially done with very little language, language becomes more and more important in organizing ideas.

These human potentials point the way to the instructional implications of looking at comprehension as reconciling the three structures. These are related by the categorizing process which would therefore appear to be central to comprehension. Consequently, ways of encouraging accurate perception of similarities and differences in items of information and of making the seeking of them an automatic part of the learning process would seem to be called for. The early grades are the place to start this emphasis, but the information there would not, of course, be presented in the form of expository text.

A second implication of making the categorizing process central in comprehension instruction is that it would require numerous opportunities

for students to not only find common characteristics in information presented, but create for themselves generalizations about these characteristics in language which is both appropriate and precise. While the productive use of language may be different from the act of reading, learning how to form generalizations should enhance the ability to recognize those of others. In both the seeking of common characteristics and their description in suitable language, the emphasis has to be on student decisions. Memorizing the categories of others may have many uses, including perhaps improving the amount of domain-specific knowledge available, but it will not lead to the active seeking of relationships essential to comprehension of expository text. When language remains connected to perceptual decisions about concrete or abstract information it is more likely to serve the user well.

The third implication of attempting to harmonize the three structures of text, underlying concepts, and reader schemata is that the reading of expository text and the seeking after relationships be made in some way meaningful to the students. The inborn capacity to create categories functions by filtering out information which is not at the moment meaningful. Returning to the opening figure of the four people seeing four different gardens, it might be said that if all four are to see the structure of the garden, like the artist, they must have a convincing reason for changing their natural information-processing system. Perhaps there is to be a prize for drawing the most accurate plan of the garden or the group is planning an entertainment in the garden. No matter what the reason, it must make sense.

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